OCEAN ACOUSTIC OBSERVATORIES

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Category: Long-Range Propagation

LONG-TERM GOALS

The long-term goals of this work are to enhance the understanding of ocean processes that ultimately determine the limits of long-range acoustic transmissions, to understand the spatial and temporal behavior of low-frequency noise processes (earthquakes, volcanoes, storms, biology) that control the signal-to-noise ratios for long range transmission as well as to search for any correlations among these phenomena, and to improve our capabilities for acoustic detection in the ocean.

OBJECTIVE

The objective of this project is to record individual channels from 1-2 existing SOSUS arrays in the Pacific to provide continuous acoustic time series with a bandwidth of 100 Hz.

APPROACH

Report Documentation Page

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At very low frequencies, it has been established that the ocean provides a very coherent medium for widely separated receivers. It is our intent to extend our understanding of interprocessing acoustic measurements to full ocean basin scales. Through the acquisition of data from very widely separated arrays over an extended period of time, the long-term, large-scale environmental effects on acoustics can be investigated. In essence, this is the initial research effort for an ocean acoustic observatory - a telescope in the ocean.

The initial emphasis of this project has been on the planning for acquisition of the digitizing and recording hardware and its installation at 1-2 SOSUS array sites. The data will be archived for use by the investigators and other scientists with interests in the analysis of long-term observations.

Scientifically, the focus of this work will be to identify and track naturally-occurring phenomena such as large-scale storms as they move across the ocean basin, earthquakes, and volcanic eruptions, shipping, and marine mammals. Ultimately, the intent is to link the acoustic measurements with other sensing systems, particularly satellite imagery for storm activities and seismic measurements for earthquake and volcanic eruptions.

WORK COMPLETED

In cooperation with the Naval Postgraduate School, planning is proceeding for the installation of digitizing and recording hardware at the Pt. Sur SOSUS array site. The necessary hardware has been acquired. The hardware will digitize 32 channels of data at 200 Hz and with a 24-bit resolution. The hardware has been tested thoroughly and outputs data in a standard format (SEG-Y) which can be readily read and processed by software at MPL/IGPP. The resulting archival tapes will be sent to San Diego for cataloging and storage. A processing facility has been established and will be available for use in analyzing the data. The archive also includes data from the now-closed arrays previously recorded at Keflavik, Iceland.

RESULTS

Installation of the digitizing and recording hardware at Pt. Sur is scheduled for Fall 1997. Additional discussions are underway with NRaD/NCCOSC concerning access to the data from the San Nicholas Island SOSUS arrays.

IMPACT / APPLICATIONS

The ultimate limits to long-range acoustic transmissions are imposed by ocean processes, including internal waves, mesoscale variability, interior ocean boundaries (fronts), atmospheric and ocean weather, and bathymetric scattering. Extending our capabilities for acoustic detection and acoustic transmission depends on an understanding of these

processes and their impact on acoustics through long-term observations and is critical for a broad range of ocean studies including the Acoustic Thermometry of Ocean Climate (ATOC) program.

TRANSITIONS

The data will be archived for use by the investigators and other scientists with interests in the analysis of long-term observations.

RELATED PROJECTS

The hardware installations will take advantage of ATOC interfaces already installed at the candidate array sites. The sites will necessarily receive the ATOC source signals and we intend to work closely with that program in analysis of the data.